

# H a b i l i t a t i o n

**Freie Universität Berlin**

**Fachbereich Physik**

Arnimallee 14, 14195 Berlin

Im Zuge seines Habilitationsverfahrens wird

**Herr Dr. Daniel Maximilian Reich**

am **Freitag, d. 25. April 2025** um **15.15 Uhr** im  
**Hörsaal A (1.3.14)** seinen öffentlichen wissenschaftlichen  
Vortrag über das Thema:

**“Can Density Functional Theory Assist the Search  
for Room-Temperature Superconductors?”**  
halten.

Anschließend findet eine öffentliche Aussprache statt.

**Die Vorsitzende der Habilitationskommission**

**Prof. Dr. C. Koch**

---

Abstract: In 2023, initial claims of the so-called LK-99 compound showing superconductivity up to around 400 K at atmospheric pressure gathered broad attention, even spreading into popular media. While experimental replication attempts immediately followed suit, theoretical efforts were focused on understanding the material's potential as a room-temperature superconductor via numerical simulations. A key approach was the use of density functional theory (DFT) which aims to obtain information about the electronic structure in many-body systems via formulating the problem in terms of the electronic density instead of the full many-particle wave function. For LK-99 the scientific consensus was quickly reached that it does not show superconducting properties at standard conditions. Still, room-temperature superconductors remain one of the most sought-after compounds. In this talk I will discuss the reasons for this broad interest as well as the principles behind density functional theory and how it can act as a theoretical tool to investigate superconductivity.